WHAT IS CLAIMED IS:

1. A combustion method that reduces the amount of NOx emitted, comprising:

(A) providing a combustion device;

(B) feeding primary air and fuel into said device through a burner that comprises means for feeding secondary air into said combustion device and optionally comprises means for feeding tertiary air into said combustion device;

(C) separating air outside the combustion device into an oxygen-rich stream and a nitrogen-rich stream;

(D) combusting said fuel in a flame, while feeding at least a portion of said oxygen-rich stream into said flame,

(E) and feeding at least a portion of said nitrogen-rich stream into said combustion device.

2. A method according to claim 1 wherein at least a portion of said nitrogen-rich stream is fed into said combustion device through one or both of said means for supplying secondary air and said means for supplying tertiary air.

3. A method according to claim 1 wherein step (E) comprises feeding 10 vol.% to 100 vol.% of the nitrogen-rich stream obtained in step (C) into said combustion device.

4. A method according to claim 1 wherein step (E) comprises feeding 50 vol.% to 100 vol.% of the nitrogen-rich stream obtained in step (C) into said combustion device.

5. A method according to claim 1 wherein up to 25 vol.% of the stoichiometric amount of oxygen required for combustion of said fuel is supplied by said oxygen-rich stream.

6. A method according to claim 1 wherein said nitrogen-rich stream is heated before it is fed through said burner by indirect heat exchange with flue gas produced in said combustion device by said combustion.

7. A method according to claim 1 wherein a portion of flue gas produced in said combustion device by said combustion is fed with said nitrogen-rich stream in step (E).

8. A method according to claim 1 wherein a spray of liquid water is fed with said nitrogen-rich stream in step (E).

9. A method according to claim 1 further comprising injecting at least a portion of said nitrogen-rich stream into said primary air that is fed into said device in step (A).

10. A combustion method that reduces the amount of NOx emitted comprising:

(A) providing a combustion device that has a primary combustion zone and a burn out zone;

(B) feeding air and fuel through a burner into said primary combustion zone;

(C) separating air outside the combustion device into an oxygen-rich stream and a nitrogen-rich stream,

(D) combusting the fuel in a flame in the primary combustion zone, while
feeding at least a portion of said oxygen-rich stream into said primary combustion zone,

(E) adding air from a source other than said burner into said burn out zone in an amount containing sufficient oxygen that the total amount of oxygen fed into said device is at least the stoichiometric amount needed for complete combustion of said fuel, and combusting residual combustibles from said primary combustion zone in said burn out zone,

(F) and feeding at least a portion of said nitrogen-rich stream into said combustion device.

11. A method according to claim 10 further comprising feeding at least a portion of said nitrogen-rich stream into said burnout zone.

12. A method according to claim 10 wherein step (E) comprises feeding 10 vol.% to 100 vol.% of said nitrogen-rich stream into said burn out zone.

13. A method according to claim 10 wherein step (E) comprises feeding 50 vol.% to 100 vol.% of said nitrogen-rich stream into said burn out zone.

14. A method according to claim 10 wherein up to 25 vol.% of the stoichiometric amount of oxygen required for combustion of said fuel is supplied by said oxygen-rich stream.

15. A method according to claim 10 wherein said nitrogen-rich stream is heated before it is fed to said burn out zone by indirect heat exchange with flue gas produced in said combustion device by said combustion.

16. A method according to claim 10 wherein a portion of flue gas produced in said combustion device by said combustion is fed with said nitrogen-rich stream in step (E).

17. A method according to claim 10 wherein a spray of liquid water is fed with said nitrogen-rich stream in step (E).

18. A method according to claim 10 wherein the nitrogen-rich stream fed in step (E) is fed at a velocity sufficient to promote mixing of said air fed in step (E) and residual combustibles from the primary combustion zone in said burnout.

19. A method according to claim 10 further comprising injecting into or downstream of said burn out zone a reducing reagent that reacts with NOx to form N_2 and thereby lessens the amount of NOx that would otherwise be emitted from said furnace.

20. A method according to claim 10 further comprising injecting at least a portion of said nitrogen-rich stream into said air that is fed into said device in step (A).

21. A combustion method that reduces the amount of NOx emitted, comprising:

(A) providing a combustion device;

(B) feeding primary air and fuel into said device through a burner that comprises means for feeding secondary air into said combustion device and optionally comprises means for feeding tertiary air into said combustion device;

(C) combusting said fuel in a flame, while feeding an oxygen-rich stream into said flame, and

(D) injecting a spray of liquid water into said combustion device.